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50 Years of Research . . .

The John Jacob Astor Experiment Station

. . . Its Development, Program, and Accomplishments

1913 to 1963

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50 YEARS OF RESEARCH . . .
THE JOHN JACOB ASTOR BRANCH EXPERIMENT STATION--ITS DEVELOPMENT, PROGRAM AND ACCOMPLISHMENTS

1913 to 1963

H. B. Howell and R. S. Besse

HISTORICAL BACKGROUND

Grass Today, and Cheese Tomorrow

This is no myth or idle dream, but an actuality in the practice of harvesting nature's wonder crop--grass--by the dairy industry in the coastal area. This is routine procedure in parts of the region between the Oregon coast mountains and the sea, an area approximately 300 miles long and 30 miles wide, where grass grows lush and naturally, water is abundant, the climate is temperate, and the growing season ranges from 210 to 282 days annually.

The multi-million dollars this industry contributes annually to Oregon's economy did not "just happen", but is the accrual of many years of ingenuity, development, cooperation, and hard work.

As recently as 1913 thousands of acres of potential grass and crop land was in swampy tidelands or cut-over stump areas. Clearly these areas presented unique problems quite different from those in other parts of the state. There latent prospects of solution were outlined to the Oregon legislature which established the Astor Experiment Station in 1913 and appropriated $3,000 annually "to test new crops, fruits and vegetables, to determine the best varieties for this section, to secure information on the requirements of the soil in order that crop production will be more profitable, and to investigate the various problems pertaining to the dairy industry of the coast section." Broadly the station's assignment was to investigate and demonstrate the agricultural possibilities of reclaiming and utilizing tidelands and logged-off lands.

The station was established on county-owned land in accordance with legislative requirement, and was located 4 miles southeast of Astoria along the Walluski River. Fifty acres of the original tract was swampy tidelands and 20 acres was logged-off hill land. Only limited research plots could be established until most of the land was cleared of the dense growth of rushes, reeds, swamp grass, logs, and stumps and leveled. A group of prisoners from the Oregon State Penitentiary were brought in to assist in the land clearing job, pulling out logs and brush with horses shod with 2 x 12 plank "shoes" to maneuver in the mud flats. Almost 6 years were required to make the land suitable for the broader research program for which the station was established.

Physical Plant-Research Facilities

Through the years the county has supplied additional land until now (1962) the station occupies 150 acres, nearly all utilized for experimental plots or for forage production. In addition there is a 40-acre tract of timber land on the station set aside as an "outdoor classroom" for forest management

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Buildings include a dairy barn and loafing shed, a combination hay drying and calf feeding barn, a beef wintering barn, several storage and implement sheds, a field laboratory, a conference building, an office building, and five residences.

Although the land and buildings are owned by Clatsop County, they have been conditionally deeded to the state for as long as experimental work is conducted with these facilities.

Essential technical experimental equipment, tractors, trucks, and farm machinery necessary for efficient operation are owned by the station.

Personnel and Technical Positions

The present efficient operation of the research program requires a technically trained superintendent, four technical assistants, and one secretary-clerk. The first superintendent from 1913-1915 was the late Harry A. Lindgren. He was followed by Glen H. Roberts from 1916 to 1917 and by Harold R. Taylor 1918 to 1919. Albert Engbretson served as superintendent for 15 years from 1919 to 1934, and the current (1962) superintendent is Herbert H. Howell who accepted this position in 1934. The present technical assistants are Sidney W. Pryor, Howard D. Dorman, Fielding Miller, and James T. Waldrop. From 1946 to 1955, Elmer Dent served as assistant superintendent. Also, a number of graduate students have aided in the program while conducting research for their theses.

PROGRESS AND ACHIEVEMENTS

Historically and naturally the coast area was destined to be dairy country, with earlier settlers and modern farmers capitalizing on the natural grasslands. For the Experiment Station to best serve the dairy industry, it was necessary to develop a dairy herd that would command the respect of dairymen and breeders in the area concurrently with studying other problems of the industry.

With a very modest beginning of cows of average or below production, the herd has been improved until now it ranks among the nation's best in the Guernsey breed.

Four Gold Star Breeder Awards Won

It was one of the 44 Gold Star Guernsey breeder herds in the United States in 1961, and one of 63 such herds in 1962. In 1961 there were only four such herds (including this one) west of Iowa, and in 1962 there were eight such herds in this area. The station herd won this award in 1959, 1960, 1961 and 1962. Only six other herds in the country have won it four times and five herds have won it five times.

To qualify as a "Gold Star Breeder Herd" under the rules of the American Guernsey Cattle Club, the herd must:

1. Be at least 75% bred by the herd owner.

2. Have produced a herd average of at least 10,300 pounds of milk and 500 pounds of butterfat during the year.

3. Have a type classification rating of 82.5% or better.

4. Be certified by the state and federal governments as free from tuberculosis and brucellosis.

High National Average Butterfat Production Achieved

Based upon another comparison, without the above Gold Star breeders' requirement, this station herd rated first in butterfat production (725 pounds-mature equivalent-305 days-two times milked) and second in milk production (12,761 pounds per cow) in competition with 41,166 Guernsey cows under official test in the United States in 1962. It also rated first in butterfat production (685 pounds) and sixth in milk production (12,288 pounds per cow) in 1961. The breed average for the 41,166 cows under official test in 1962 was 9,581 pounds of milk and 465 pounds of butterfat.

Factors Affecting Production Studied

Extensive studies were made to determine the items that influenced production.

Good breeding found basic. A cow must have the inherited ability to produce, and she will not exceed that ability no matter how she is handled. This station has been fortunate over the years; several outstanding breeders have furnished it with superior Guernsey sires. A. L. Gile of Chicona Farms at Chinook, Washington, loaned the station three of his outstanding proved sires. This background of the best blood in the Guernsey breed was followed by the loan of another great sire by Fred Rudat, Jr., of Brownsmead, Oregon. A double grandson of the Great Fritzlyn Jeanette's Flash Bull was given to the Station by Samuel Berke, Deeplake Farms, Lakewood, Connecticut. An exchange of bulls with Bayville Farvir, Norfolk, Virginia, has made available another famous blood line. The assistance of these notable breeders and their generous help in improving the station herd is acknowledged. The station has also purchased a number of outstanding sires, aiding in the continuous betterment of its purebred high-producing herd.

Proper feeding is vital. A dairy cow must convert her feed into milk, not body fat. The station feeds a cow all she will eat all of the time; and if she gets fat, she is sent to the butcher. The most efficient feeding program found by the station consists of using locally grown grasses and clovers, harvested on the immature side, and made into silage early in the spring by the wilting process and preserved with molasses. Pastures, hay, some grain, and certain minerals complete the year-round feeding system. Pastures and silage constitute the principal roughage feeds.

Pasturing during the summer season is arranged so that each day the cows have access to a small area of fresh grass. After the entire pasture is grazed in this manner, beef cows are turned in to harvest the grass more completely.

The pasture is then clipped, cleaned up, and allowed to grow until its next turn in the rotation, about 30 days hence.

Tests show that use of proper minerals in the dairy ration is especially important in the coastal area where the heavy annual rainfall leaches out part of the essential elements, such as phosphorus, copper, and cobalt, thereby reducing the amounts of such elements in locally grown feeds.

Experiments conducted for a 15-year period indicate the need for mineral supplements that furnish phosphorus and assist in the assimilation of phosphorus in the ration. The following table presents the average per cow milk and fat production for the 15-year period when varying amounts of copper sulphate, magnesium sulphate, and cobalt were added to the ration.

Annual Production Per Cow, Astor Experiment Station Dairy Herd
1947 to 1961

Period	No. cows	Av. milk prod./cow	Av. butterfat production/cow	Mineral supplements added
		lbs.	lbs.	
1947-1951	21	8,717	438	2% bone meal and salt
1952-1956	23	9,550	510	2% bone meal and salt plus 1/4 gram copper sulphate per cow per day
1957-1958	30	9,783	538	2% bone meal and salt plus 1/2 gram copper sulphate per cow (over 30 lbs. milk) per day
1959-1961	26	12,083	642	2% bone meal and salt plus 1 gram of copper sulphate per cow per day

Although improved breeding, feeding, and management may have contributed to the increased production, it appears that the addition of copper to the ration has helped the cows to assimilate phosphorus. There is some evidence that the magnesium content of this feed is also assisting in phosphorus assimilation.

Effective management essential. Management involves many factors, the chief one of which is interested, reliable manpower. The station's herdsman and his assistant take as keen an interest in the experimental herd and handle it as carefully and efficiently as if they owned the cows.

Gentle care in feeding and milking, a watchful eye on each cow's condition, and a uniform time of milking pay big dividends in production from contented cows.

The proper raising of calves and young stock is vital to maintaining the herd. The Station's two-year-olds weigh from 1,050 to 1,200 pounds at freshening time; they have the size and vitality to effectively start their careers of production.

Forage Standards Sought

Since forage production in the coastal area is the lifeblood of the dairy industry, the Astor Station has in cooperation with H. A. Schoth and H. H. Rampton of the U. S. Department of Agriculture conducted hundreds of experiments, tests, and trials in its search for improved varieties or kinds of forage that would meet the following requirements:

1. Have good vigor and grow well under existing high-moisture and high-acidity conditions.

2. Be suitable for pasture, silage, and/or hay.

3. Be palatable to cattle.

4. Be long-lived mixtures of grasses and legumes that fit into rotations.

5. Be reasonably resistant to fungus diseases, slugs, and insects.

6. Resist the invasion of bentgrass and velvetgrass.

7. Be slow in sending up seed heads.

Improved Forage Crops Introduced and Released

As a result of the growing and testing of many varieties of domestic and foreign forage crops, the station has introduced, released, and recommended the following forage crops for farmer production:

1. Two varieties of Lotus uliginosis, commonly known as big trefoils. The selections were named Beaver and Columbia, and are now in commercial seed channels.

2. S-143 orchardgrass, from seed obtained from the British Isles, and now extensively grown on the coast uplands.

3. New Zealand hybrid, a true hybrid between English and Italian ryegrass having excellent hybrid vigor. This grass is also grown widely in the uplands of the coast.

4. Meadow foxtail which is in general use for poorly drained wet lands.

5. New Zealand white clover which has, under coastal conditions, yielded some 30% more than ladino (which it has replaced). It is more resistant to slug damage and has longer life.

6. Subterranean clover, (commonly known as sub-clover) which, when properly fertilized, makes an excellent early spring and summer growth and reestablishes itself from self-planted seed in the fall.

7. Bortfeld turnip, (from seed obtained in Denmark) a root crop, was widely used by dairymen for a number of years after its release by the station. More recent research and developments in the growing and preservation of grasses and legumes have largely replaced the growing of root crops.

The search for still better forage crops and methods of handling them continues, and the station now (1962) has about 500 plots of different varieties and strains under test.

Among those still being tested which show decided promise, and are being increased for further testing are:

1. Oregon State University 233, an improved selection of orchardgrass, which shows unusual possibilities.

2. Roskilde ryegrass, a promising long life Italian ryegrass, secured from Denmark. It is very palatable, a rapid grower, and is quite resistant to a fungus-like rust.

Effective Liming and Fertilizing Program Developed

Fertility requirements of crops in the coastal high-rainfall area require special study and consideration, because of the heavy leaching of plant nutrients. Over a period of 40 years, every conceivable fertilizer element and combination that appeared feasible for forage production has been tested. These tests provide the information necessary for this station's fertilizer recommendations, which are widely used by progressive farmers throughout the coastal area.

Lime is a must. Lime to sweeten the soil, improve the pH, and supply essential calcium to the crop is a must for efficient production. Research with lime has indicated that application of 4 or 5 tons per acre, rather than the full lime requirement, is the most efficient rate. Liming experiments conducted over a 40-year period have shown that moderate applications of ground limestone have returned approximately $3 for each $1 invested.

Potash essential for legumes. The need for potash to maintain stands of legumes and economic production has been clearly shown. Approximately 200 pounds of actual potash are required per acre annually. For each $5 expended for potash, returns have been about one ton of additional forage. This is a profitable investment in this deficit hay-producing area, where large quantities must be shipped in at high cost.

Phosphorus is required. Phosphorus is required on most coastal soils, and especially in the production of legumes. The station has found that a mixed fertilizer containing phosphorus and potash without nitrogen is quite profitable on legumes. On straight grass pastures 30 to 50 pounds of actual nitrogen has usually been the most efficient rate. More than 50 pounds at one application is not recommended.

Fertilization with minor elements has not shown striking results although some of the minor elements are essential for good animal nutrition.

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Beef and Dairy Cattle Nutrition Studied

Beef cattle production, which has been expanding in the coastal area, is beset with a number of problems, most of which appear to have a bearing on nutrition. For a number of years this station working jointly with members of the OSU departments of agricultural chemistry and animal science has studied nutritional deficiencies of beef and dairy cattle, making hundreds of chemical analyses of soils, forage crops, cattle blood, livers, feces, and other materials in an effort to determine mineral deficiencies and the troubles caused by them.

Magnesium tetany appears to be a nutritional disorder. This condition is known as "grass tetany" or "grass staggers" and in some years results in heavy losses. It frequently occurs in acute form when animals are turned on spring pastures. It appears to be largely confined to certain "affected" areas, implying a nutritional background for this disorder.

Symptoms are somewhat like those of milk fever, but the animals are more excitable, and if not properly treated may die within a few hours. Emergency treatment by veterinarians saves a high percentage of these animals, but does not get at basic preventive measures. Feeding of magnesium supplements is considered by many to reduce the incidence of this disorder, although the conditions under which such supplements are effective have not been precisely determined.

Phosphorus deficiency causes trouble. Most coastal soils are deficient in phosphorus, and the crops grown on such soils are also deficient. A phosphorus deficiency in livestock may result in wood and bone chewing, retarded growth and bone development, and reproductive disturbances.

Copper deficiency in lower Columbia. Many cattle, particularly those grazed on certain lowland areas, show symptoms of copper deficiency. This condition is complicated by an excessive intake of molybdenum and other factors which interfere with the utilization of copper. Scouring and bleached hair coats respond to appropriate supplementation with copper.

Cobalt-deficient animals starve with an abundance of feed within reach. This trouble manifests itself by the animal's refusal of feed it would normally eat with relish. Fortunately the condition appears in only a small percentage of beef animals in the area, but is highly variable from season to season. Cobalt-deficient animals quickly respond to appropriate supplementation with cobalt.

Station formula reasonably effective in controlling above maladies. This station, again working jointly and in cooperation with OSU scientists, developed a mineral formula that has been reasonably effective in reducing losses from nutritional disorders in both beef and dairy animals. It is most effective when fed to livestock on a year around basis in mixed dairy rations, but it can be supplied free choice or sprinkled on silage when cattle are being winter fed.

This mineral formula is now widely used throughout the coastal area, and its use is spreading to the Willamette Valley and to eastern Oregon sections.

Tussock Weed Controlled

These rush-like tussock are common in poorly drained tidelands and uplands throughout the coastal area, occupying a considerable acreage of good grass land. The old practice of chopping out these tussock clumps and burning or plowing out with heavy expensive equipment was costly and not fully effective.

This station, working jointly and in cooperation with the weed research group at OSU, developed the use of spray applications with 2,4-D plus 5% diesel oil which gave very good and more permanent control at a cost of only about 5% of the previous method.

New and Better Crops Sought

The station conducts a continuous search for new, improved or better crops that is of twofold importance. First, testing and screening of every crop that appears to have promise in the coastal area might introduce one or more that would have a potential far exceeding any now in use. Secondly, such testing and screening shows what not to grow, saving newcomers and others from wasting money on unsuited crops. It also answers many questions of new settlers coming from other areas of the country with perhaps greater diversification.

ECONOMIC EVALUATION OF ACCOMPLISHMENTS

Obviously it would be impossible accurately to measure the economic benefits of the research program of the John Jacob Astor Branch Experiment Station from 1913 to 1963. Nevertheless, the record of this station in dairy cattle breeding and its recommendations in dairy and beef cattle nutrition, crop fertilization, and forage improvement have been guideposts for the establishment of sound agricultural practices in coastal areas. The extensive testing, screening, introduction, and release of six new superior forage crops, now widely grown, replacing other less favorable crops, has directly affected farmers' incomes.

Increasing yields, reducing costs by the use of superior varieties, proper fertilization, reducing losses from diseases, and the adoption of more efficient practices creates new wealth. Such wealth is cumulative. Its creation for one year, in most cases, continues annually. It is believed that a very substantial annual increase in wealth has accrued to the Oregon coastal region from the adoption of practices recommended by this station.

THE RESEARCH PROGRAM FOR 1963

The search for new and better crops, increased efficiency, and cost reduction designed to safeguard and further develop agricultural production in the Oregon coast area continues in the following active projects for 1963:

1. Nutritional and management practices with dairy cattle in the high-rainfall coastal area of Oregon.

2. Varietal testing, management liming, and fertility practices with forage crops (conducted jointly and in cooperation with the OSU department of soils and the USDA).

3. Improved beef cattle nutrition in Oregon's coastal area conducted in cooperation with the OSU departments of agricultural chemistry and animal science.

4. Artificial drying of high-moisture baled hay under Oregon's coastal conditions.

5. Evaluation of specialty and miscellaneous crops under conditions prevailing along the Oregon coast.

6. Investigation of forest problems in a forestry demonstration area.